CLAIMS

What is claimed is:

1. A communication system comprising:

(a) an automatic gain control (AGC) circuit which receives and adjusts the gain of a communication signal, the AGC being controlled by a gain control signal; and

(b) an insertion phase variation compensation module which continuously counteracts the effects of phase offsets introduced into the communication signal by the AGC circuit, based on the gain control signal.

2. The communication system of claim 1 further comprising:

(c) a receiver which receives the communication signal from the AGC circuit and outputs analog in-phase (I) and quadrature (Q) signal components; and

(d) an analog to digital converter (ADC) which receives and converts the analog I and Q signal components to digital I and Q signal components.

3. The communication system of claim 2 wherein the insertion phase variation compensation module receives the digital I and Q signal components from the ADC and outputs altered I and Q signal components having different phase characteristics than the digital I and Q components, the communication system further comprising:

(e) a modem which receives the altered I and Q signal components, the modem including a processor which generates the gain control signal.

4. The communication system of claim 3 wherein the processor calculates how much power is input to the ADC.

5. The communication system of claim 2 wherein the insertion phase variation compensation module receives the digital I and Q components from the ADC and alters the phase characteristics of the digital I and Q components as a function of the gain control signal.

6. The communication system of claim 1 further comprising:

(c) a processor which generates the gain control signal; and

(d) a look up table (LUT) in communication with the processor and the insertion phase variation compensation module, wherein the LUT receives the gain control signal from the processor and provides estimates of the phase offsets to the insertion phase variation compensation module as a function of the gain control signal.

7. The communication system of claim 6 wherein the provided estimates include a Sin function and a Cos function of a phase offset, x.

8. The communication system of claim 7 wherein the insertion phase variation compensation module has a real, Re, input associated with a digital in-phase (I) signal component and an imaginary, Im, input associated with a quadrature (Q) signal component and, based on the estimates provided by the LUT, the insertion phase variation compensation module outputs an I signal component having a phase that is adjusted in accordance with the following function: $(\mathrm{Cos}(x) \times \mathrm{Re}) - (\mathrm{Sin}(x) \times \mathrm{Im})$.

9. The communication system of claim 7 wherein the insertion phase variation compensation module has a real input, Re, associated with a digital in-phase (I) signal component and an imaginary input, Im, associated with a quadrature (Q) signal component and, based on the estimates provided by the LUT, the insertion phase variation compensation module outputs a Q signal component having a phase that is adjusted in accordance with the following function: $(\mathrm{Sin}(x) \times \mathrm{Re}) + (\mathrm{Cos}(x) \times \mathrm{Im})$.

10. A wireless transmit/receive unit (WTRU) comprising:

(a) an automatic gain control (AGC) circuit which receives and adjusts the gain of a communication signal, the AGC being controlled by a gain control signal; and

(b) an insertion phase variation compensation module which continuously counteracts the effects of phase offsets introduced into the communication signal by the AGC circuit, based on the gain control signal.

11. The WTRU of claim 10 further comprising:

(c) a receiver which receives the communication signal from the AGC circuit and outputs analog in-phase (I) and quadrature (Q) signal components; and

(d) an analog to digital converter (ADC) which receives and converts the analog I and Q signal components to digital I and Q signal components.

12. The WTRU of claim 11 wherein the insertion phase variation compensation module receives the digital I and Q signal components from the ADC and outputs altered I and Q signal components having different phase characteristics than the digital I and Q components, the WTRU further comprising:

(e) a modem which receives the altered I and Q signal components, the modem including a processor which generates the gain control signal.

13. The WTRU of claim 12 wherein the processor calculates how much power is input to the ADC.

14. The WTRU of claim 11 wherein the insertion phase variation compensation module receives the digital I and Q components from the ADC and alters the phase characteristics of the digital I and Q components as a function of the gain control signal.

15. The WTRU of claim 10 further comprising:

(c) a processor which generates the gain control signal; and

(d) a look up table (LUT) in communication with the processor and the insertion phase variation compensation module, wherein the LUT receives the gain control signal from the processor and provides estimates of the phase offsets to the insertion phase variation compensation module as a function of the gain control signal.

16. The WTRU of claim 15 wherein the provided estimates include a Sin function and a Cos function of a phase offset, x.

17. The WTRU of claim 16 wherein the insertion phase variation compensation module has a real, Re, input associated with a digital in-phase (I) signal component and an imaginary, Im, input associated with a quadrature (Q) signal component and, based on the estimates provided by the LUT, the insertion phase variation compensation module outputs an I signal component having a phase that is adjusted in accordance with the following function: (Cos(x) × Re) - (Sin(x) × Im).

18. The WTRU of claim 16 wherein the insertion phase variation compensation module has a real input, Re, associated with a digital in-phase (I) signal component and an imaginary input, Im, associated with a quadrature (Q) signal component and, based on the estimates provided by the LUT, the insertion phase variation compensation module outputs a Q signal component having a phase that is adjusted in accordance with the following function: (Sin(x) × Re) + (Cos(x) × Im).

19. An integrated circuit (IC) comprising:

(a) an automatic gain control (AGC) circuit which receives and adjusts the gain of a communication signal, the AGC being controlled by a gain control signal; and

(b) an insertion phase variation compensation module which continuously counteracts the effects of phase offsets introduced into the communication signal by the AGC circuit, based on the gain control signal.

20. The IC of claim 19 further comprising:

(c) a receiver which receives the communication signal from the AGC circuit and outputs analog in-phase (I) and quadrature (Q) signal components; and

(d) an analog to digital converter (ADC) which receives and converts the analog I and Q signal components to digital I and Q signal components.

21. The IC of claim 20 wherein the insertion phase variation compensation module receives the digital I and Q signal components from the ADC and outputs altered I and Q signal components having different phase characteristics than the digital I and Q components, the WTRU further comprising:

(e) a modem which receives the altered I and Q signal components, the modem including a processor which generates the gain control signal.

22. The IC of claim 21 wherein the processor calculates how much power is input to the ADC.

23. The IC of claim 20 wherein the insertion phase variation compensation module receives the digital I and Q components from the ADC and alters the phase characteristics of the digital I and Q components as a function of the gain control signal.

24. The IC of claim 19 further comprising:

(c) a processor which generates the gain control signal; and

(d) a look up table (LUT) in communication with the processor and the insertion phase variation compensation module, wherein the LUT receives the gain

control signal from the processor and provides estimates of the phase offsets to the insertion phase variation compensation module as a function of the gain control signal.

25. The IC of claim 24 wherein the provided estimates include a Sin function and a Cos function of a phase offset, x.

26. The IC of claim 25 wherein the insertion phase variation compensation module has a real, Re, input associated with a digital in-phase (I) signal component and an imaginary, Im, input associated with a quadrature (Q) signal component and, based on the estimates provided by the LUT, the insertion phase variation compensation module outputs an I signal component having a phase that is adjusted in accordance with the following function: (Cos(x) × Re) - (Sin(x) × Im).

27. The IC of claim 25 wherein the insertion phase variation compensation module has a real input, Re, associated with a digital in-phase (I) signal component and an imaginary input, Im, associated with a quadrature (Q) signal component and, based on the estimates provided by the LUT, the insertion phase variation compensation module outputs a Q signal component having a phase that is adjusted in accordance with the following function: (Sin(x) × Re) + (Cos(x) × Im).

28. In a communication system including an automatic gain control (AGC) circuit and an insertion phase variation compensation module, a method of continuously counteracting the effects of phase offsets introduced into a communication signal by the AGC circuit, the method comprising:

(a) providing a gain control signal to the AGC circuit;

(b) the AGC circuit receiving and adjusting the gain of a communication signal in response to the gain control signal, the adjustment causing a phase offset to be introduced into the communication signal;

(c) providing an estimate of the phase offset to the insertion phase variation compensation module as a function of the gain control signal;

(d) the insertion phase variation compensation module adjusting the phase of the communication signal based on the provided estimate; and

(e) repeating steps (a) - (d).

29. The method of claim 28 wherein the provided estimate includes a Sin function and a Cos function of a phase offset, x.

30. The method of claim 29 wherein the insertion phase variation compensation module has a real, Re, input associated with a digital in-phase (I) signal component and an imaginary, Im, input associated with a quadrature (Q) signal component and, based on the estimate provided by the LUT, the insertion phase variation compensation module outputs an I signal component having a phase that is adjusted in accordance with the following function: (Cos(x) × Re) - (Sin(x) × Im).

31. The method of claim 29 wherein the insertion phase variation compensation module has a real input, Re, associated with a digital in-phase (I) signal component and an imaginary input, Im, associated with a quadrature (Q) signal component and, based on the estimate provided by the LUT, the insertion phase variation compensation module outputs a Q signal component having a phase that is adjusted in accordance with the following function: (Sin(x) × Re) + (Cos(x) × Im).